Work Order ID 62382

Wednesday, September 29, 2010 8:52:59 AM

Item ID: D407-667-205TRN **Accept** **Setup Start**

Revision ID: **Stop**

Item Name: Crosstube Turning Detail

Start Date: 9/29/2010 **Start Qty:** 1.00 **Cust Item ID:**

Required Date: 10/8/2010 **Req'd Qty:** 1.00 **Customer:**

Reference:

Approvals: **Process Plan:** M **Date:** 10-9-29 **Tooling:** _____ **Date:** _____ **Run Start**

QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____ **Stop**

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	**Revision Nbr**								
D407-667-245	Rev F								
100		0.00							
Mori Seiki	MORI SEIKI CNC LATHE LARGE					1			
Mori Seiki CNC Lathe Large	**Memo**	0.00				10.10.28			
	1-Fill tube with sand & install plugs DT8531 on both ends as per Folio FA248□2-Turn first side as per Folio FA248□3- File transition lines smooth.								
110	QC1- Inspect dimensions to dimension sheet	0.00							
QC						10.10.28	1		
Quality Control	**Memo**	0.00							
120		0.00							
Mori Seiki	MORI SEIKI CNC LATHE LARGE					10.10.28	1		
Mori Seiki CNC Lathe Large	**Memo**	0.00							
	1-Turn second side as per Folio FA248□2- File transition lines smooth.□3-Remove sand and plugs□4-Scribe part # and batch # using vibrating stylus as per Dwg D407-667-245 □Inside of Cuff(Donot engrave on outside of tube)								

Dart Aerospace Ltd

W/O:	WORK ORDER CHANGES						
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: D407-667-205TRN **PAR #:** N/A. **Fault Category:** Crosstube **NCR:** (Yes) No **DQA:** [illegible] **Date:** 10.11.08

Resolution: accepted **Disposition:** use-as-is **QA: N/C Closed:** [illegible] **Date:** 10/11/08

NCR: 62382	WORK ORDER NON-CONFORMANCE (NCR)							
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			
10.10.28	100	2.521 $^{+.005}_{-0.0}$ and 2.633 $^{+.005}_{-0.0}$ are -.008" and -.008" under tolerance respectively. Tools were measured and +.010" offset was added in control	CP 10.10.28 QS1042	Acceptable per attached SR.	10.10.28	10/11/02	CP 10.10.28 QS1042	10/11/02
11	100	For an approach on the finished dimension but an X-axis over travel occured before this and the limit switches became stuck. This is whats believed to have	CP 10.10.28	11	11	10/11/02	CP 10.10.28	10/11/02
11	100	caused inaccuracy with the X axis. and was confirmed by co-worker. RC: EQUIPMENT.	CP 10.10.28	11	11	10/11/02	CP 10.10.28	10/11/02

NOTE: Date & initial all entries

Work Order ID 62382

Wednesday, September 29, 2010 8:52:59 AM

Item ID: D407-667-205TRN **Accept** **Setup Start** **Stop**

Revision ID:

Item Name: Crosstube Turning Detail

Start Date: 9/29/2010 **Start Qty:** 1.00

Required Date: 10/8/2010 **Req'd Qty:** 1.00

Reference:

Cust Item ID:

Customer:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start **Stop**

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	QC1- Inspect dimensions to dimension sheet	0.00				1			
QC	**Memo**	0.00							
Quality Control									
140	QC8- Inspect parts - second check	0.00				1			
QC	**Memo**	0.00							
Quality Control									
150	Crosstubes Chemical Conversion	0.00				1			
HandFXtube	**Memo**	0.00							
Hand Finishing Crosstubes	Ensure no sand is in the tube before alodine.								

10.10.28

10/11/02

SAD 10-11-03

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Work Order ID 62382

Wednesday, September 29, 2010 8:52:59 AM

Item ID: D407-667-205TRN **Accept** **Setup Start** **Stop**

Revision ID:

Item Name: Crosstube Turning Detail

Start Date: 9/29/2010 **Start Qty:** 1.00 **Cust Item ID:**

Required Date: 10/8/2010 **Req'd Qty:** 1.00 **Customer:**

Reference:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____ **Run Start** **Stop**

QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160	QC3- Inspect Part Finish	0.00	DP		10-11-4				
QC	**Memo**	0.00							
Quality Control									
170		0.00				(1)			
Packaging	Packaging								
Packaging	**Memo**	0.00							
	Identify and stock in kanban rack☐Location: ~~LG~~ LG SAD 10-11-04								
180	QC21- Final Inspection - Work Order Release	0.00							
QC	**Memo**	0.00					10/11/04		
Quality Control									

MF 10-11-4

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

Wednesday, September 29, 2010 8:53:03 AM

Work Order ID: 62382

Parent Item: D407-667-205TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 9/29/2010 **Required Date:** 10/8/2010

Start Qty: 1.00 **Required Qty:** 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec
IPP Rev B 08.04.02 Removed polish EC verified by: DD
IPP Rev:C 08-08-19 revE as per dwg DD verified by:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6011-115 Crosstube Material		Manufactured	No			120	Each	15.0000	1	1			

Location	Loc Qty	Loc Code
LG	15	
58413	15	

112.910"

10.10.28

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	62382
Description: Crosstube Assembly	Part Number:	D407-667-245
Inspection Dwg: D407-667-245 **Rev:** F		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

[X] First Article [ ] Prototype

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.490	+0.005/-0.000	2.491	✓		Verner unless otherwise	
	1.832	+0.005/-0.000	1.833	✓		specified RQ-02	
	1.838	+0.005/-0.000	1.839	✓			
	1.892	+0.005/-0.000	1.893	✓			
	2.052	+0.005/-0.000	2.053	✓			
	2.206	+0.005/-0.000	2.207	✓			
	2.521	+0.005/-0.000	2.513	✓			
	2.633	+0.005/-0.000	2.624	✓			
	4.10	+/-0.030	4.10	✓			
	4.978	+/-0.030	4.980	✓			
	2.040	+0.000/-0.010	2.038	✓			
	0.125	+/-0.010	.125	✓			
	R0.063	+/-0.010	R.063	✓		rad gage	
	R0.500	+/-0.010	R.500	✓		rad gage	
SIDE B	2.490	+0.005/-0.000	2.491	✓			
	1.832	+0.005/-0.000	1.833	✓			
	1.838	+0.005/-0.000	1.839	✓			
	1.892	+0.005/-0.000	1.893	✓			
	2.052	+0.005/-0.000	2.053	✓			
	2.206	+0.005/-0.000	2.207	✓			
	2.521	+0.005/-0.000	2.521	✓			
	2.633	+0.005/-0.000	2.633	✓			
	4.10	+/-0.030	4.10	✓			
	4.978	+/-0.030	4.980	✓			
	2.040	+0.000/-0.010	2.038	✓			
	0.125	+/-0.010	.125	✓			
	R0.063	+/-0.010	.063	✓		rad gage	
	R0.500	+/-0.010	.500	✓		rad gage	
	112.91	+/-0.020	112.93	✓		measuring tape RQ-14	

Measured by:		Audited by:		Prototype Approval:	N/A
Date:	10-10-28	Date:	10/11/02	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	04.04.21	New Issue (P/O D407-667-205)	KJ/RF	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	06.03.30	Tolerance revised for 4.978 dimension	KJ/JLM	
D	07.02.19	Dwg Rev updated	KJ/JLM	
E	09.05.20	Dwg Rev updated	KJ	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

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			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item	QTY -245	PART NUMBER	DESCRIPTION
1	X	D407-667-245	**CROSSTUBE ASSEMBLY (407 HIGH AFT)**
2	1	D6011-115	CROSSTUBE
3	2	D2856-400-773	ABRASION STRIP
4	2	D2873-043	NUT PLATE
5	2	D2873-045	NUT PLATE
6	1	D2894-1	SUPPORT
7	2	D3190-1	CHAFING SHIELD
8	2	D3595-063-430	RUBBER CUSHION
9	14	MS20601AD4W8	RIVET (OR NAS9302B-4-8)
10	4	MS21920-22	CLAMP
11	2	MS21920-25	CLAMP (OR MS21920-24)
12	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 62382
BJ 10-9-29

RELEASED
05/11/12

GENERAL NOTES:

1) MATERIAL: MANUFACTURED FROM D6011-115
   FINISHED LENGTH = 112.91±0.020
2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
   PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
   PAINT OUTSIDE PER DART QSI 005 4.2
3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
4) UNITS: INCHES UNLESS OTHERWISE NOTED.
5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
6) IDENTIFICATION: SCRIBE DART PART NUMBER "D407-667-245" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
7) WEIGHT: 27.7 lbs
8) PART IS SYMMETRIC ABOUT CENTERLINE.
9) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
10) BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
12) INSTALL D2894-1 CENTER SUPPORT USING A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
13) INSTALL MS21920-25 CLAMPS WITH D3595-063-430 RUBBER CUSHIONS TO SECURE D2894-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
    NOTE: MS21920-24 CLAMPS CAN BE USED TO ACCOMMODATE VARYING DIAMETERS. ENSURE THERE IS A MINIMUM OF 1.5 THREADS IN SAFETY ON THE NUTS.
14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
15) INSTALL D2856-400-773 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE, PER QSI 035.
16) INSTALL D3190-1 CHAFING SHIELDS SO THAT OVERLAP IS ON BOTTOM SIDE OF CROSSTUBE OPPOSITE D2894-1 SUPPORT.
17) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

REV.	DESCRIPTION	BY	DATE
F	REFORMAT NOTES TO NEW STANDARDS (ZN B8-1); RELOCATED FLAG # 6 (ZN A8-3) PER NCR 210; REMOVED REF. & ADD TOLERANCES (ZN C6-3, C4-3 & D2-3)	RF	08.11.06
E	8.02 AND 8.53 WERE 8.40 AND 8.90 (ZN D5-2); REORGANIZED VIEWS AND REFORMATED DRAWING TO CURRENT STANDARDS. REASONS: CLAMPS MOVED 0.375 TOWARD CL TO ELIMINATE INTERFERENCE WITH AIRCRAFT MOUNTS. REFERENCE: PAR#08-21 AND ECN#1225	MB	08.07.24
D	ADD VIEW FOR OEM SKID HOLES, ROTATE ORIENTATION OF CLAMPS SECTION F-F, REMOVE -851 ABRASION STRIP, ADD MAGNOBOND 6398, ADD CUSHION	PH	07.02.07
C	ADD HOLES AND NUT PLATES FOR COMPATIBILITY WITH BHT/AA SKIDTUBES	PH	05.07.26
B	ADD CHAFING SHIELD	CP	03.05.21
A	NEW ISSUE	CP	02.05.13

DESIGN		**DART AEROSPACE LTD**	
DRAWN	RF	**HAWKESBURY, ONTARIO, CANADA**	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D407-667-245	SHEET 1 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASS'Y (407 HIGH AFT)	NTS
DATE	08.11.06		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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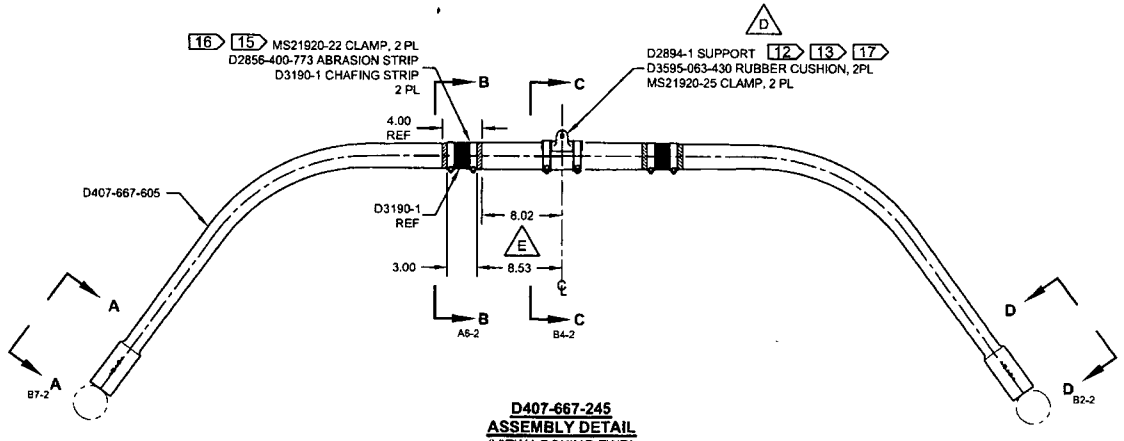
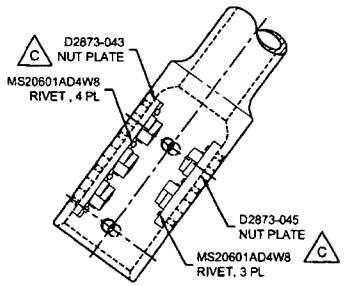
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

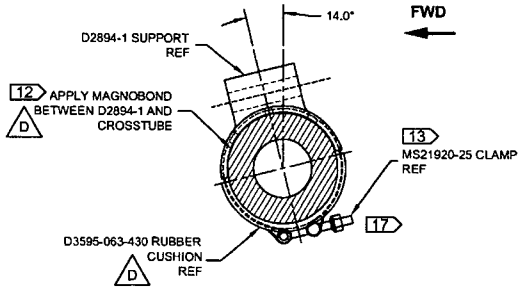
w/o 42382



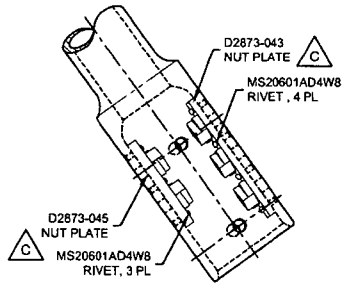
D407-667-245
ASSEMBLY DETAIL
(VIEW LOOKING FWD)



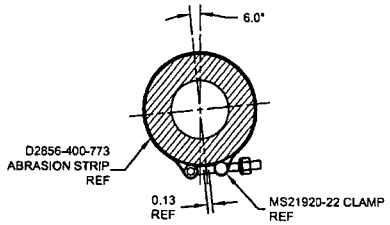
C7-2 **VIEW A-A CUFF DETAIL**
SCALE 4X



C4-2 **SECTION C-C**
SCALE 4X



C2-2 **VIEW D-D CUFF DETAIL**
SCALE 4X



C5-2 **SECTION B-B**
SCALE 4X, 2PL

RELEASED
09/11/12

DESIGN		**DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA
DRAWN	RF	
CHECKED		DRAWING NO. D407-667-245 REV. F SHEET 2 OF 4
MFG. APPR.		
APPROVED		TITLE CROSSTUBE ASS'Y (407 HIGH AFT) SCALE NTS
DE APPR.		
DATE 08.11.06		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

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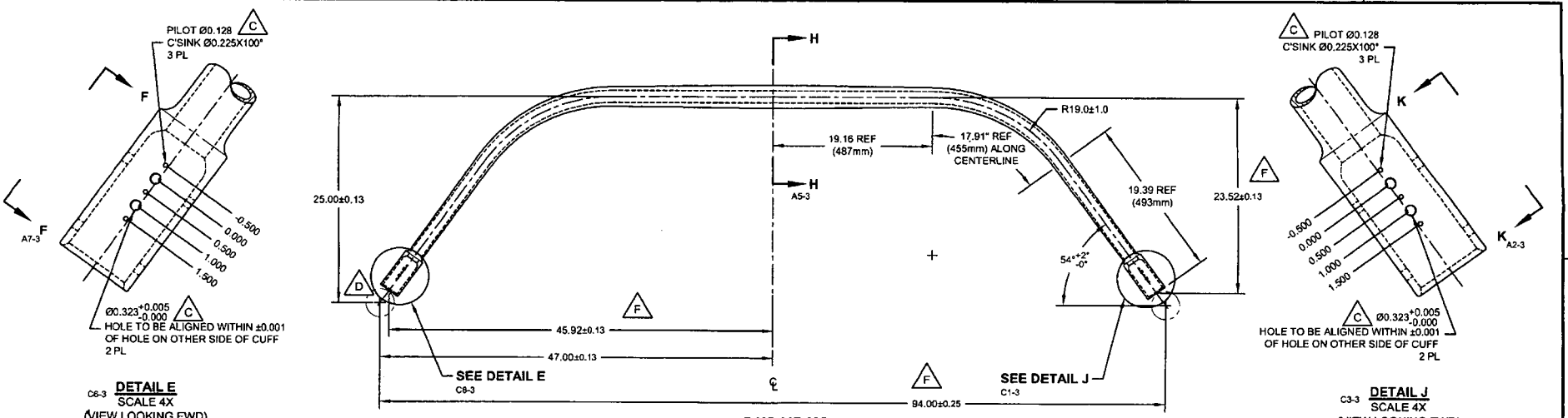
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

w/o 42382

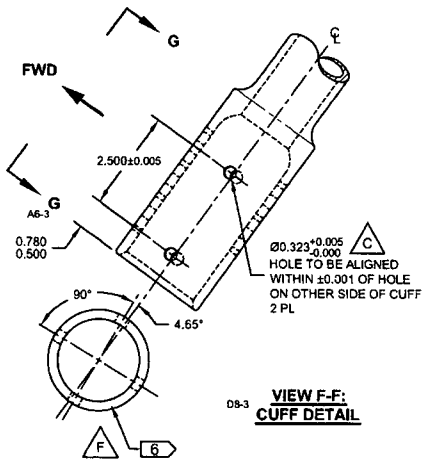


C6-3 **DETAIL E**
SCALE 4X
(VIEW LOOKING FWD)

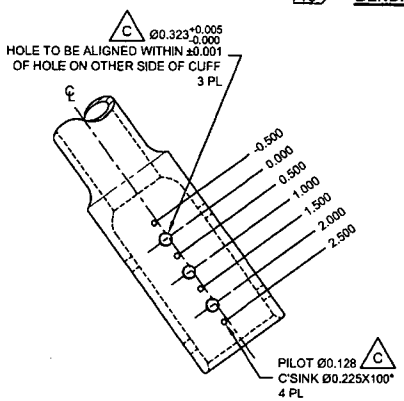
10 **D407-667-605**
BENDING AND DRILLING DETAIL
(VIEW LOOKING FWD)

C3-3 **DETAIL J**
SCALE 4X
(VIEW LOOKING FWD)

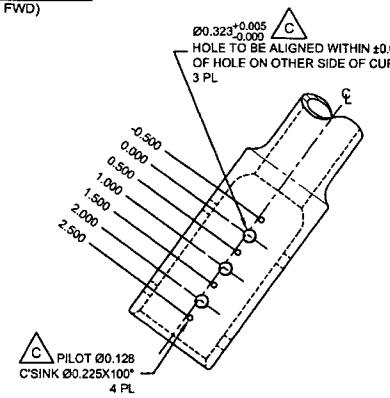
RELEASED
06/11/06



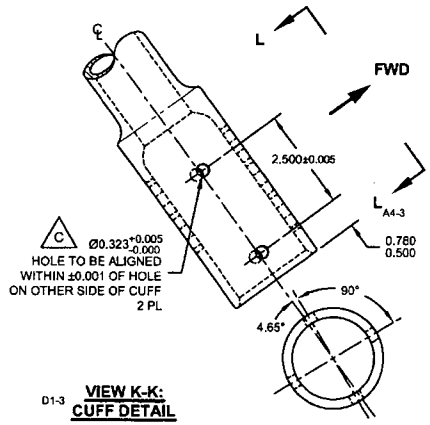
D8-3 **VIEW F-F:**
CUFF DETAIL



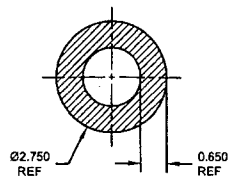
B8-3 **VIEW G-G**
(VIEW LOOKING AFT, ROTATED)



B1-3 **VIEW L-L**
(VIEW LOOKING AFT, ROTATED)



D1-3 **VIEW K-K:**
CUFF DETAIL



D4-3 **SECTION H-H**
SCALE 4X

DESIGN		**DART AEROSPACE LTD**	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D407-667-245	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASS'Y (407 HIGH AFT)	NTS
DATE	08.11.06		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

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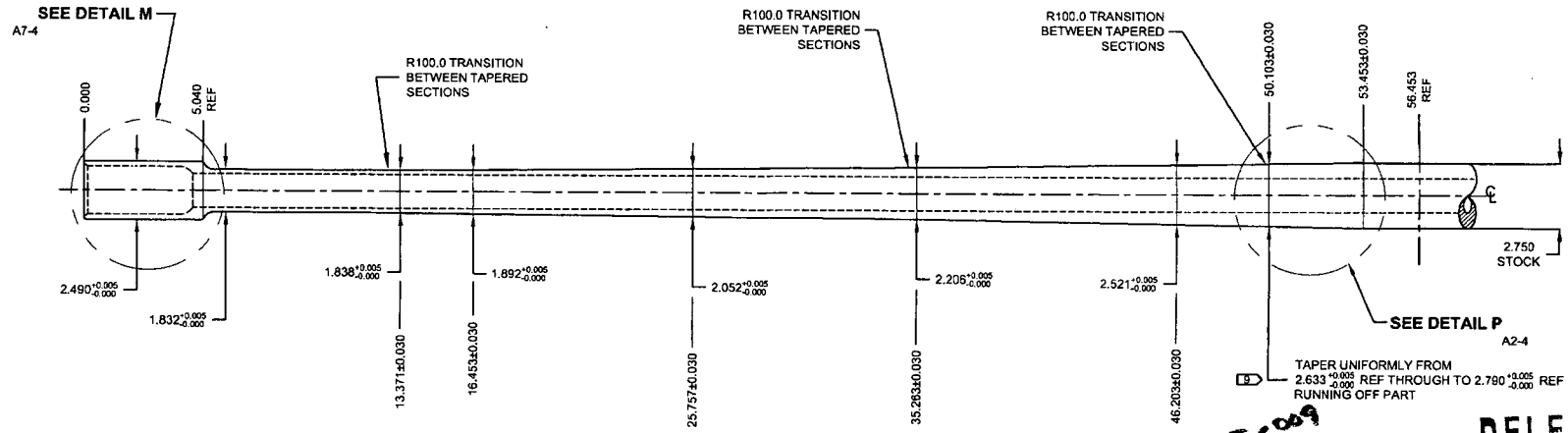
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

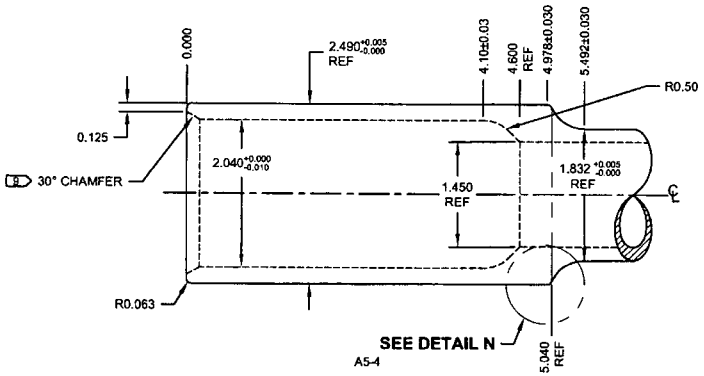
w/o 62382



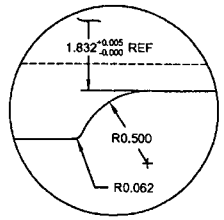
D407-667-245 MACHINING DETAIL

-.008 -.009

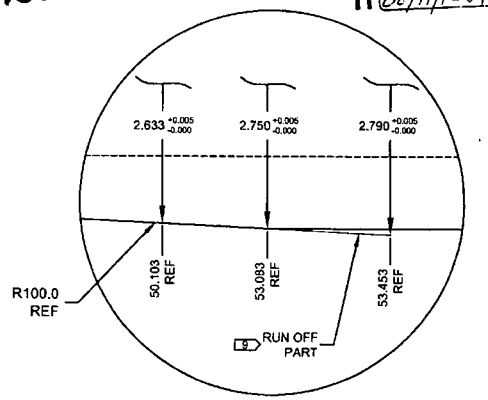
RELEASED
08/11/12



D8-4 **DETAIL M: CROSSTUBE CUFF**
SCALE 3X



B6-4 **DETAIL N: CUFF TRANSITION**
SCALE 2X



C1-4 **DETAIL P: TAPER RUN-OFF**
NOT TO SCALE

DESIGN		**DART AEROSPACE LTD**	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D407-667-245	SHEET 4 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASS'Y (407 HIGH AFT)	NTS
DATE	08.11.06		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Except from SR-D407-667-1

SECTION	Cross tube	Damage Tolerance	O.D. (in)	I.D. (in)	Area (in^2)	Inertia (in^4)
A-A	Bell Aft	0.000	2.750	1.450	4.288	2.590
	Bell Aft w/ dam. tol.	0.005			4.283	2.581
	Dart Aft	0.000	2.750	1.450	4.288	2.590
	Dart Aft w/ dam. tol.	0.015			4.146	2.519
B-B	Bell Aft	0.000	2.642	1.450	3.831	2.175
	Bell Aft w/ dam. tol.	0.005			3.826	2.166
	Dart Aft	0.000	2.624	1.450	3.756	2.110
	Dart Aft w/ dam. tol.	0.015			3.614	2.041
C-C	Bell Aft	0.000	2.215	1.450	2.202	0.965
	Bell Aft w/ dam. tol.	0.005			2.197	0.958
	Dart Aft	0.000	2.206	1.450	2.171	0.946
	Dart Aft w/ dam. tol.	0.015			2.028	0.884
D-D	Bell Aft	0.000	2.029	1.450	1.582	0.615
	Bell Aft w/ dam. tol.	0.005			1.577	0.610
	Dart Aft	0.000	2.042	1.450	1.624	0.636
	Dart Aft w/ dam. tol.	0.015			1.481	0.577
E-E	Bell Aft	0.000	1.818	1.450	0.945	0.319
	Bell Aft w/ dam. tol.	0.005			0.940	0.315
	Dart Aft	0.000	1.826	1.450	0.967	0.329
	Dart Aft w/ dam. tol.	0.015			0.825	0.273
F-F	Bell Aft	0.000	1.811	1.450	0.925	0.311
	Bell Aft w/ dam. tol.	0.005			0.920	0.307
	Dart Aft	0.000	1.820	1.450	0.950	0.322
	Dart Aft w/ dam. tol.	0.015			0.808	0.266
G-G	Bell Aft	0.000	2.500	2.040	1.640	1.067
	Bell Aft w/ dam. tol.	0.005			1.635	1.060
	Dart Aft	0.000	2.490	2.040	1.601	1.037
	Dart Aft w/ dam. tol.	0.030			1.393	0.874

SECTION	Cross tube	Bending Ultimate (lb*in)	Bending Yield (lb*in)	Tension Ultimate (lb)	Tension Yield (lb)	Shear Ultimate (lb)*
A-A **	Bell fwd w/ DT	123885	105114	282696	239863	179898
	Dart fwd w/ DT	141057	120906	319227	273623	169978
	Margin of Safety	0.14	0.15	0.13	0.14	-0.06
B-B	Bell fwd w/ DT	108216	91819	252510	214251	160688
	Dart fwd w/ DT	~~119777~~	102666	278277	238523	148174
	Margin of Safety	0.11	0.12	0.10	0.11	-0.08
C-C	Bell fwd w/ DT	57118	48464	145005	123034	92276
	Dart fwd w/ DT	61697	52883	156181	133869	83161
	Margin of Safety	0.08	0.09	0.08	0.09	-0.10
D-D	Bell fwd w/ DT	39673	33662	104086	88315	66237
	Dart fwd w/ DT	43544	37324	114049	97756	60727
	Margin of Safety	0.10	0.11	0.10	0.11	-0.08
E-E	Bell fwd w/ DT	22879	19412	62010	52614	39461
	Dart fwd w/ DT	23004	19718	63522	54448	33824
	Margin of Safety	0.01	0.02	0.02	0.03	-0.14
F-F	Bell fwd w/ DT	22371	18981	60693	51497	38623
	Dart fwd w/ DT	22483	19271	62199	53314	33119
	Margin of Safety	0.01	0.02	0.02	0.04	-0.14
G-G ***	Bell fwd w/ DT	55943	47467	107925	91573	68679
	Dart fwd w/ DT	54077	46352	107230	91911	57096
	Margin of Safety	-0.03	-0.02	-0.01	0.00	-0.17

Margin still positive with 0.009 loss OD.

Acceptable 10.10.28